

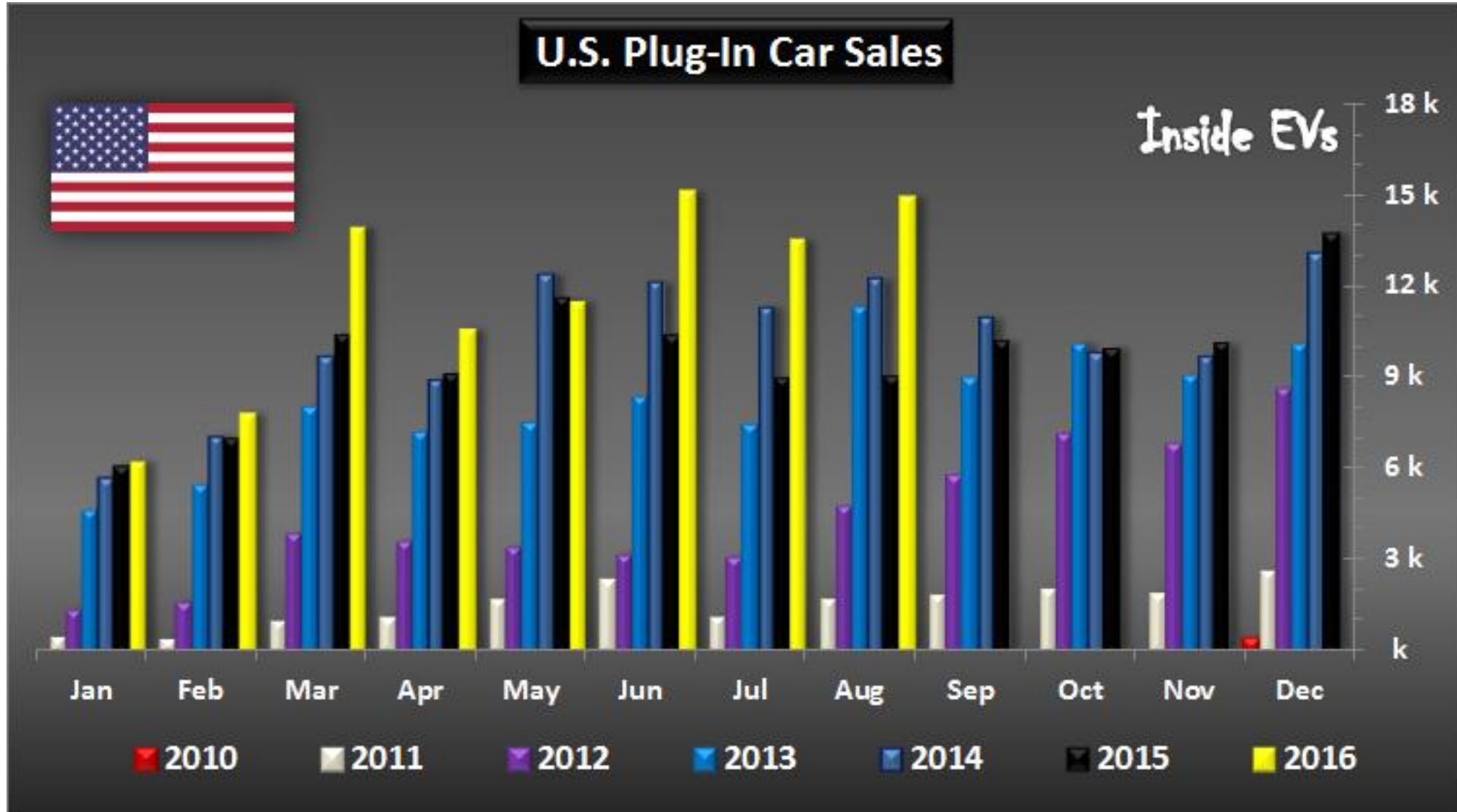
CARB Advanced Clean Cars Symposium

Britta K. Gross

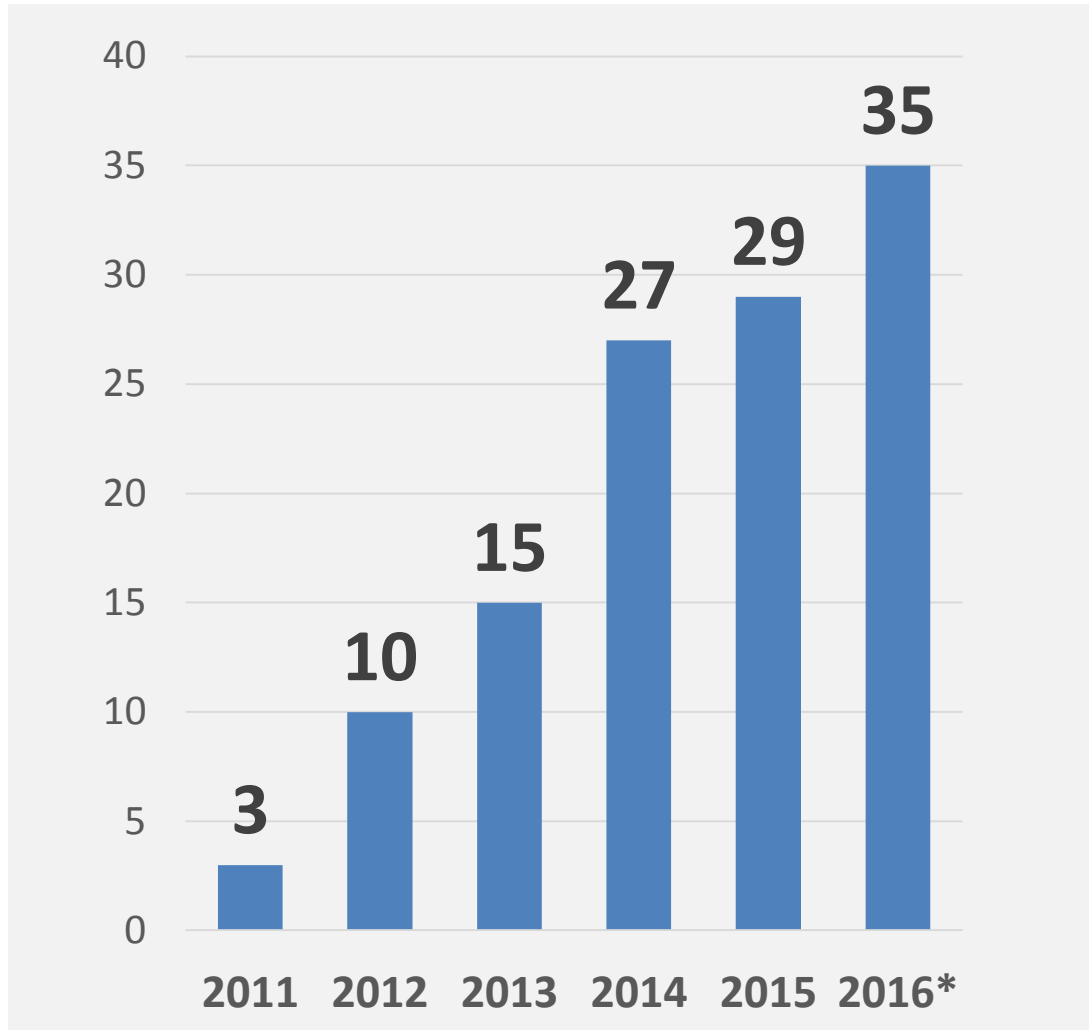
GM, Director Advanced Vehicle Commercialization Policy



Continued Growth in the EV Market



More ZEV Models



Source: Auto Alliance

* Expected models by the end of 2016

EPA Vehicle Category	Number of Models
Mini-compact Car	1
Two-Seater	1
Subcompact Car	7
Compact Car	5
Midsize Car	6
Large Car	3
Small Station Wagon	1
Small SUV	1
Standard SUV AWD	5
Mini-Van (end of CY2016)	1

ZEV Models Available in 2016

BEV

13

BMW i3 BEV

Chevrolet Bolt *

Chevrolet Spark EV

Fiat 500e

Ford Focus Electric

Kia Soul Electric

Mercedes-Benz B250

Mitsubishi i-MiEV

Nissan Leaf

Smart fortwo EV

Tesla Model S

Tesla Model X

Volkswagen e-Golf

PHEV

19

Audi A3 e-tron

BMW i3 REX

BMW i8

BMW 330e

BMW X5 xDrive40e

BMW 740e PHV *

Cadillac ELR

Chevrolet Volt

Chrysler Pacifica PHV *

Ford C-MAX Energi PHV

Ford Fusion Energi PHV

Hyundai Sonata Plug-in Hybrid

Mercedes-Benz GLE550e

Mercedes S550H PHV

Mercedes C350e PHV *

Porsche Cayenne S E-Hybrid

Porsche Panamera S E-Hybrid

Toyota Prius PHV

Volvo XC90 AWD PHEV

FCEV

3

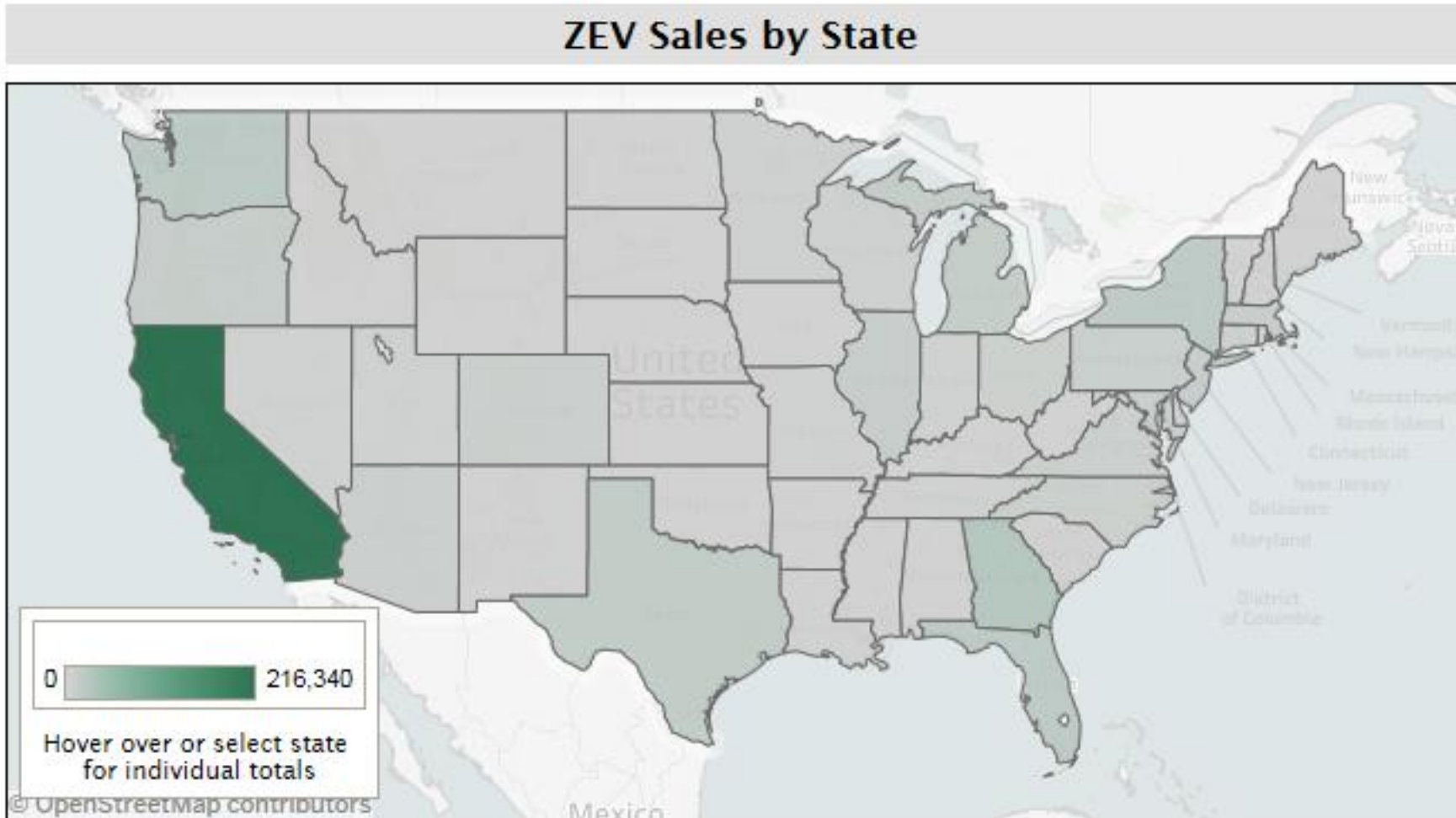
Hyundai Tucson

Toyota Mirai

Honda Clarity *

* Arriving in 2016

Half a million EVs sold in the U.S. (status thru June'16 below)



Sales by ZEV Category

BEV 223,574

FCEV 423

PHEV 222,622

Grand Total 446,619

Source: Auto Alliance - <http://www.zevfacts.com/sales-dashboard.html>

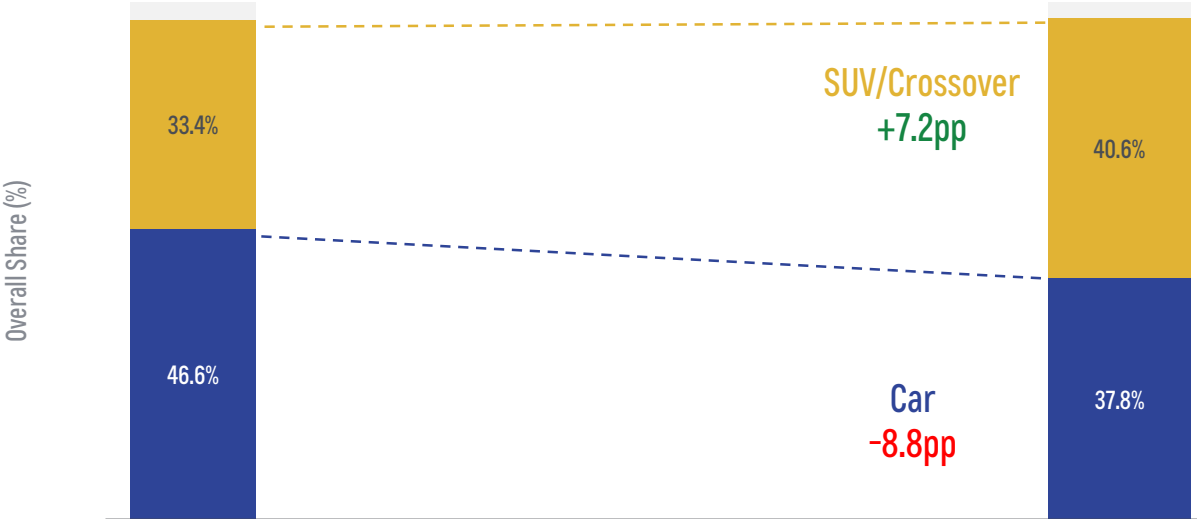
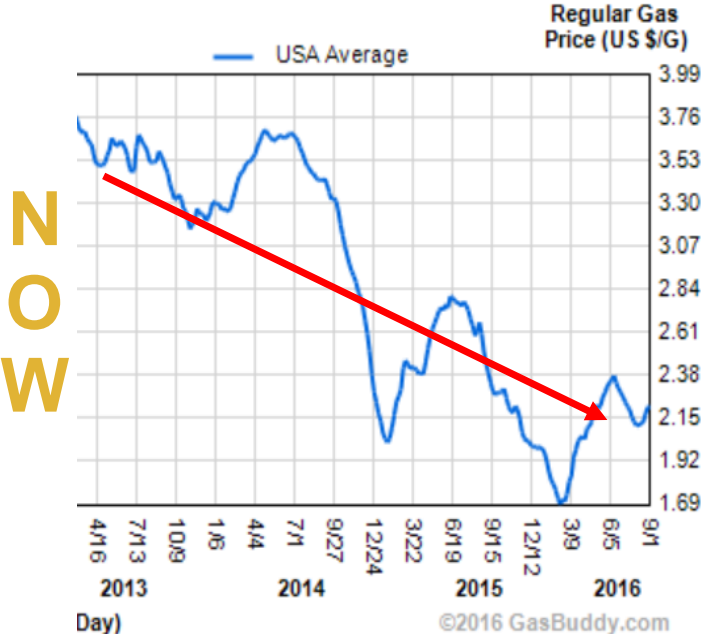
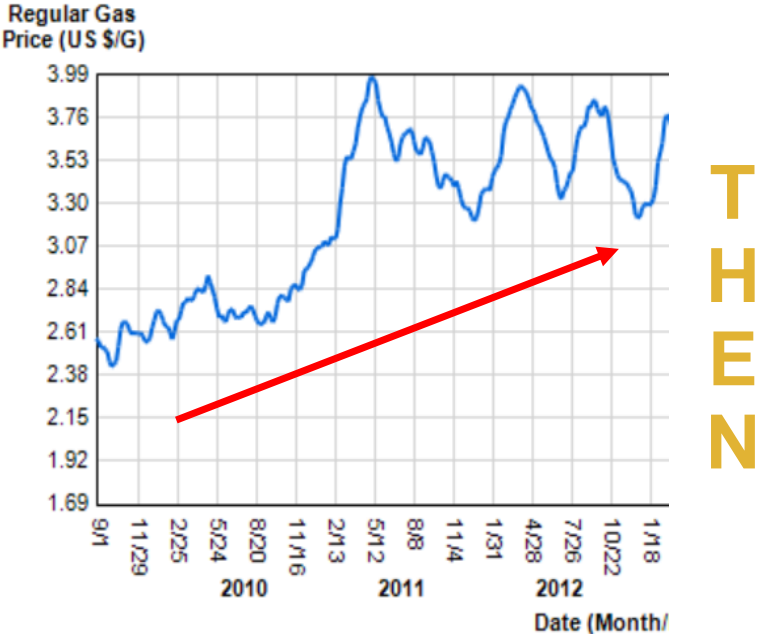
Jan 2011-June 2016

Chevy Volt Retail Deliveries by State: January-August 2016

Volt Retail by State (2016: Jan-Aug)				
Rank	State	Sales	%	Veh Reg Rank
1	CA	7,088	49.6	1
2	MI	953	6.7	11
3	NY	619	4.3	4
4	FL	531	3.7	3
5	WA	371	2.6	13
6	MA	366	2.6	15
7	TX	352	2.5	2
8	IL	344	2.4	6
9	MD	313	2.2	22
10	OR	272	1.9	28
11	VA	255	1.8	12
12	CO	234	1.6	23
13	OH	219	1.5	5

- **Volt total 2016 sales through Aug: 14,295**
- **2017MY Volt now available in all 50 states**
(Bolt EV will also be available in all 50 states)
- **Chevrolet incentivizes Volt in all ZEV states**
- **California accounts for 50% of Volt sales**
(led by retail deliveries in LA and SF)
- **Inventory Snapshot this week:**
 - Day's Supply is the Most Important metric
 - **CA supply is X days**
 - **NE supply is over 1.5X days** (not incl. Maine)
 - Over 2,300 Volts in inventory in ZEV states
 - 1,660 in CA (60% sold)
 - 600 in NE states (40% sold)

Environment Today



EV Headwinds

Occupational Licensing Industry News OLIN 2015-07

Truth-In-Advertising Laws/Electric Vehicle Prices

Effective: Immediately

Purpose

The purpose of this memorandum is to remind advertisers about truth-in-advertising laws and warn against advertising a "net price" for the purchase of electric vehicles (EVs).

Warning

The manufacturers of EVs are advertising prices, which are not the manufacturers' suggested retail price (MSRP), or cash price, but are a "net price" after deducting a potential federal tax credit, California rebate, and other "savings." These are false statements, which mislead consumers and violate truth-in-advertising laws. The Department of Motor Vehicles (DMV) recognizes EVs are relatively new, may have reduced purchase operating costs compared with combustion engine vehicles, and that advertisers seek to creatively promote EV sales. Nevertheless, advertising laws must be followed and enforced. For this reason, DMV is now warning and will enforce advertising laws with accusations against manufacturers' licenses, and with referral of such cases to local, state, and federal prosecutors.

CA DMV: OEMs and Dealers warned to not promote "net price after incentives" for EVs (i.e. MSRP only)



May 12, 2016

Why charging an electric vehicle at night is worse for the environment



August 26, 2016

Could a lithium shortage derail electric car boom?

The New York Times

OCT. 10, 2015

In California, Electric Cars Outpace Plugs, and Sparks Fly

1st to 2nd Generation EREV Improvements: Chevrolet Volt

1 st Gen Volt	Metric	2 nd Gen Volt
38	EV Range (miles)	53
382	Total Range (EV+gas miles)	420
37	Fuel Economy (gas mpg)	41
16.5	Battery (kWh)	18.4
4	Passenger Capacity	5
3.4 sec*	0 to 30	2.6 sec
9 sec	0 to 60	8.4 sec
273	Torque (ft-lb)	294
3.3	Charger (kW)	3.6
80%	EV-only Trips	90% (exp)
900	Miles between gas fill-ups	1000 (exp)



Gen 1 Volt



Gen 2 Volt

* Edmunds

1st to 2nd Generation BEV Improvements: Chevrolet Bolt

1 st Gen EV (Spark EV)	Metric	2 nd Gen EV (Bolt EV)
82 miles	EV Range	238 miles
19 kWh	Battery	60 kWh
4	Passenger Capacity	5
86.3 ft ³	Passenger Volume	94.4 ft ³
3 sec	0 to 30	< 3
7.2 sec	0 to 60	< 7
3.3 kW	Charger	7.2 kW
3 states	Availability	50 states



Spark EV



Bolt EV

ADDITIONAL PURCHASE CONSIDERATIONS



CAR INTENDERS



EV INTENDERS



238 **MILES**
EPA-ESTIMATED
RANGE



The media coverage of the range announcement was phenomenal, reaching more than 20 million people.

MEDIA ENGAGEMENT

/ Deeper engagement media/mediums





DIGITAL TRENDS

THE WALL STREET JOURNAL.

CONSUMER-FACING MARKETING

/ Cultivate social communities for owners/advocates to share electric passion and knowledge

 **CHEVROLET**



53 MILES OF PURE ELECTRIC RANGE.

[Learn More](#)

Preproduction model shown. Actual production model may vary. Available Feb. 2015.

You asked, and we listened. The all-new 2016 Volt now offers up to 53 miles of pure electric range,* nearly a 40 percent increase over the first generation.






Volt can drive gas- and emissions-free on a full charge of electricity stored in its new 18.4 kWh lithium-ion battery. When the battery runs low, a gas-powered generator seamlessly operates to extend the driving range for a total of up to 420 miles* on a full charge and a full tank of gas. To top it off, we expect our owners will go over 1,000 miles* between fill-ups when charging regularly.

Want to know more? Visit chevrolet.com/volt.

Join the conversation at [#NextGenVolt](#)

[DEALS & OFFERS](#) / [SERVICE OFFERS](#) / [BUILD & PRICE](#) / [LOCATE A DEALER](#)

[FOLLOW CHEVROLET](#)






The Man Who Made Driving a Chevrolet Volt His Life's Work

By Chevrolet June 10, 2016



Richard "Buzz" Smith is fascinated by new technology. The Texas native and father of three has been driven to explore new and emerging technology since the 1980s. An engineer by training, Buzz calls himself an "early adopter" of audio and video technology.

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Like 178 [33 Comments](#)



CONNECTED TV

Targeted custom destination via Brightline, Samsung Smart TV, and Roku



00H

Digital boards and vehicle charging stations in New York, California, Boston

LIFESTYLE DIGITAL

Custom media partnerships with Wired, Green Car Reports, The Verge, CNET, NPR



IN-MARKET DIGITAL



Target shoppers across Edmunds, Jumpstart, KBB, TEN, Cars.com

PRINT

LIFESTYLE: *Wired, Fast Company, The Atlantic, Esquire*
BUFF BOOKS: *Car and Driver, Road & Track, Motor Trend*



CRM

Keeping handraisers informed and engaged



DIGITAL VIDEO

TEN content and "Startup" pre-roll



SPOT TV


LA, San Francisco, New York, Boston

DEALER READINESS

/ Create sales consultant tools to improve customer experience and provide a universal res

9:41 AM100%

OVERVIEW



SPLIT-FOLDING REAR SEATS
create a spacious, flat cargo loading area, plus a storage bin hides the charge cord


DRIVER TOOLS

- The range estimator calculates nearly every efficiency factor: temperature, driving style, elevation changes and HVAC settings. It provides a Confidence Gauge with estimated high and low range.
- Bolt EV offers the most accurate range estimations of any plug-in vehicle.
- Bolt EV owners will also receive an Energy Usage Score based on their driving habits.

9:41 AM100%

ENGINE & PROPULSION

ELECTRIC MOTOR with 7.05:1 gear ratio in drive unit produces a GMestimated 266 lb.-ft. of torque for readily available passing power



DRIVE UNIT

- Single motor propulsion system offers lively performance
- Smooth and powerful acceleration with no shifting or engine revving
- Liquid cooled to maintain performance in all conditions
- Offset gear wheel and shaft (vs. planetary gear) to provide high 7.05:1 final drive ratio

GM-ESTIMATED SPECIFICATIONS

ELECTRIC RANGE	200-plus miles ¹
HORSEPOWER	205 hp (153 kW)
TORQUE	266 lb.-ft. (360 Nm)
MPGE (MILES PER GALLON EQUIVALENT)	116
0 TO 60 MPH ACCELERATION	Under 7 seconds
BATTERY CAPACITY	60 kWh

¹ Based on GM testing. Official EPA estimates not yet available.



Test Drive My Way.com



A New Way to Test Drive.

You choose the time & place, we bring the ride.
No sales pressure, no obligation.

Give It A Try ▾

Ride-Sharing and EVs

Lyft and GM's Express Drive Expands to Colorado and California

Welcomes Chevrolet Bolt EV in California

2016-07-11

...Express Drive's California members will have access to vehicles from the **largest electric vehicle fleet in ridesharing**, including the 2017 Chevrolet Bolt EV (available late 2016) and the extended-range electric 2016 Chevrolet Volt...

Goal is to create largest EV fleet in ridesharing

- **High mileage** application for ZEV technology
- **High exposure** for riders and drivers alike to the benefits of EVs
- **Express Drive** (GM rentals to Lyft drivers) operates in Chicago, Boston, DC, Baltimore, SF, LA. Denver planned.



Express Drive

Allows ride-share drivers to make extended rentals of a quality vehicle at a great value including insurance and maintenance



A Bolt EV in a rideshare fleet will provide real-world experience with ZEV technology for a large, much more diverse number of drivers and passengers.

Car-Sharing and EVs

GM's car-sharing service launched this year

- Operates in Ann Arbor, NYC, Chicago, Boston, DC
- Announced San Francisco, LA, Denver

City: **MAVEN**

Maven is an open sharing model allowing members to make reservations for station-based round-trip use of a variety of vehicles located around the city

Community: **MAVEN+**

Maven+ is an exclusive offering featuring a dedicated fleet for residential communities with added white-glove service and member perks



MAVEN



Volt is one of the most popular vehicles in the Maven fleet and will help drive broader EV awareness and market acceptance

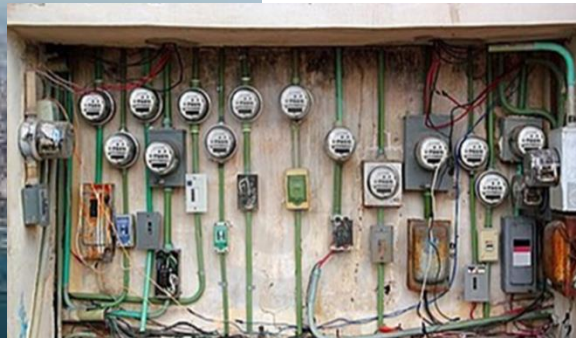
DC Fast-Charging Strategies

1. Consumer perception of limited EV range
→ requires long, connected EV corridors
2. New urban transportation models
→ require dense urban coverage
3. Consumers in Multi-Unit Dwellings (MUDs)
→ require targeted “corner gas station” coverage to expand customer base

“EVs really can take me anywhere”

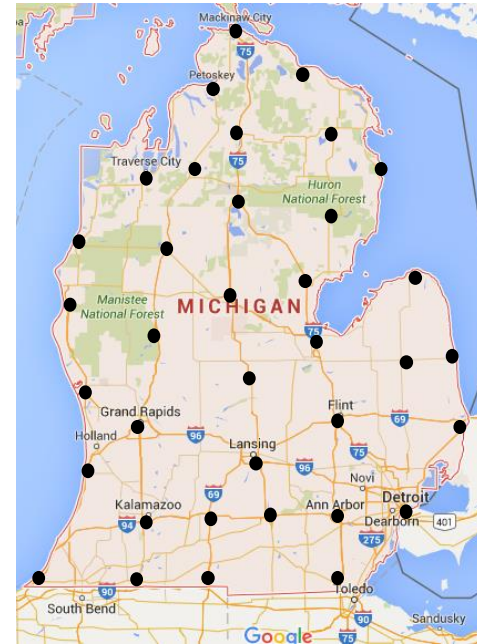
“I need to be able to get in and out fast”

“This solves my problem. I can consider an EV now!”



Industry DC Fast-Charging Trends and Needs

- **Charge Rate (and future-proofing):** Current need is 50kW hardware, however future-proofing the underlying infrastructure (electrical service, conduit/wiring, transformers, ...) should anticipate future charge rates of 150kW-350kW.
- **Dependability:** Multiple stations at each site to ensure redundancy (minimum 2); and 24-hour remediation of station issues.
- **Throughput:** High-traffic sites will require 4-8 charge stations per site to avoid lengthy wait-times
- **Siting Support:** Utility engagement is critical for the cost-effective siting and installation of DC fast-charging stations (e.g. load assessments)
- **Payment:** Consumer-friendly pricing (incl. pay as you go option), clearly marked, and common interface (e.g. single RFID tag) between all stations
- **Signage:** Consider a robust signage strategy



GM Beyond Transportation

THE POWER OF COMMITMENT

350 FACILITIES *IN* **59** COUNTRIES → **100%** RENEWABLE ENERGY

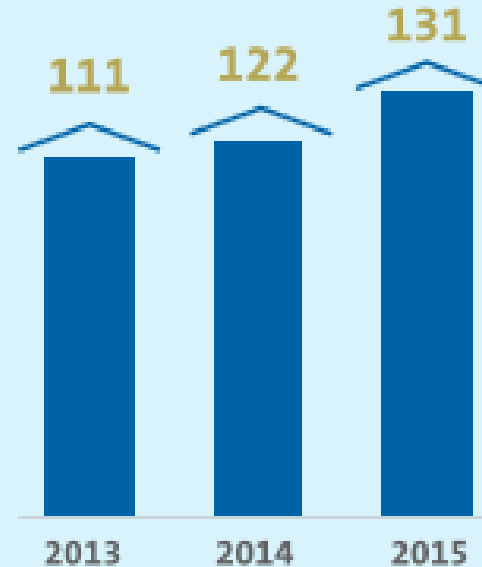
BY 2050



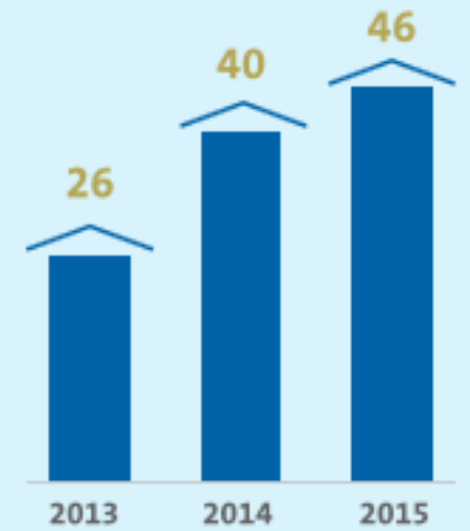
GM will meet its 2020 goal to use 125 megawatts of renewable energy by the end of this year (2016).

Doing business with a greater sense of purpose

GM's Landfill-Free Sites



GM's Wildlife Habitats



Intelligent Transportation in the next decade (2025)

- ▶ Automated highway driving
- ▶ Partial/full urban driving
- ▶ Extensive V2V (and V2P) capability
- ▶ Acceleration of intelligent infrastructure
- ▶ High-volume/high-speed integrated connectivity
- ▶ Efficiency/electrification
- ▶ Shared mobility

